The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
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Report Number **BTC 19141A**

An acoustic test report covering laboratory sound insulation testing to BS EN ISO 10140-2:2010 on a range of Hadley metal stud partitions with various plasterboard and insulation configurations.

Test Dates: 20th & 21st July 2015

Report issued date: 29th July 2015

www.btconline.co.uk

Customer: **Hadley Group/Hadley Industries FZE (Dubai)**
Downing Street
Smethwick
West Midlands
B66 2PA

UKAS TESTING
0296

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FOREWORD

The test sponsor was Hadley Group/Hadley Industries FZE (Dubai).

Chris Hobbs of CMH Design and Consultancy Services Limited witnessed the test and was acting on behalf of the test sponsor.

The test specimen was installed by AllTone and Chris Hobbs between the 20th and 21st July 2015.

The Building Test Centre played no role in the design or selection of the materials comprising the test specimen.

REPORT AUTHORISATION

Report Author	Authorised by
Martin Lynch AMIOA *Scientist*	**Alexandra Ahern** B.Eng. MIOA *Section Manager*

The Building Test Centre will not discuss the content of this report without written permission from the test sponsor. The Building Test Centre retains ownership of the test report content but authorises the test sponsor to reproduce the report as necessary in its entirety only.

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TEST CONSTRUCTION

All test specimens were constructed in an aperture having an overall opening of 2400mm (high) x 3600mm (wide).

H19141AA

Hadley HRP5310 148mm standard track was fixed to the head and base of the aperture using 25mm British Gypsum drywall screws spaced at 600mm centres.

Hadley HRP5302 146mm 'C' studs were positioned between the head and base channels at each end of the aperture and fixed using 25mm British Gypsum drywall screws spaced at 600mm centres.

Hadley HRP5302 146mm 'C' studs were positioned between the head and base channels at 600mm centres.

A single layer of 25mm Isover APR 1200 was placed in the stud cavity.

The framework was clad with a double layer of 15mm Gyproc SoundBloc on the both sides.

The inner layer of boards were fixed around the perimeter at 300mm centres using 25mm British Gypsum drywall screws.

The outer layer of boards were fixed around the perimeter and the intermediate stud positions at 300mm centres using 42mm British Gypsum drywall screws.

All vertical joints were staggered between layers. All joints and screw heads were taped. The perimeter was taped and sealed with Gyproc Sealant.

H19141BA

Same as H19141AA with the layer of 25mm Isover APR 1200 removed.

H19141CA

Same as H19141AA with the double layer of 15mm Gyproc SoundBloc replaced with a double layer of 12.5mm Gyproc SoundBloc.

The inner layer of boards were fixed around the perimeter at 300mm centres using 25mm British Gypsum drywall screws.

The outer layer of boards were fixed around the perimeter and the intermediate stud positions at 300mm centres using 36mm British Gypsum drywall screws.

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H19141DA

Hadley HRP5305 52mm standard track was fixed to the head and base of the aperture using 25mm British Gypsum drywall screws spaced at 600mm centres.

Hadley HRP5927 50mm 'C' studs were positioned between the head and base channels at each end of the aperture and fixed using 25mm British Gypsum drywall screws spaced at 600mm centres.

Hadley HRP5927 50mm 'C' studs were positioned between the head and base channels at 600mm centres.

A single layer of 25mm Isover APR 1200 was placed in the stud cavity.

The framework was clad with a single layer of 12.5mm Gyproc WallBoard on both sides.

The boards were fixed around the perimeter and the intermediate stud positions at 300mm centres using 25mm British Gypsum drywall screws.

All vertical joints were staggered between layers. All joints and screw heads were taped. The perimeter was taped and sealed with Gyproc Sealant.

H19141EA

Hadley HRP5305 52mm standard track was fixed to the head and base of the aperture using 25mm British Gypsum drywall screws spaced at 600mm centres.

Hadley HRP5927 50mm 'C' studs were positioned between the head and base channels at each end of the aperture and fixed using 25mm British Gypsum drywall screws spaced at 600mm centres.

Hadley HRP5927 50mm 'C' studs were positioned between the head and base channels at 600mm centres.

The framework was clad with a double layer of 15mm Gyproc SoundBloc on both sides.

The inner layer of boards were fixed around the perimeter at 300mm centres using 25mm British Gypsum drywall screws.

The outer layer of boards were fixed around the perimeter and the intermediate stud positions at 300mm centres using 42mm British Gypsum drywall screws.

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All vertical joints were staggered between layers. All joints and screw heads were taped. The perimeter was taped and sealed with Gyproc Sealant.

H19141FA

Hadley HRP5307 72mm standard track was fixed to the head and base of the aperture using 25mm British Gypsum drywall screws spaced at 600mm centres.

Hadley HRP5299 70mm 'C' studs were positioned between the head and base channels at each end of the aperture and fixed using 25mm British Gypsum drywall screws spaced at 600mm centres.

Hadley HRP5299 70mm 'C' studs were positioned between the head and base channels at 600mm centres.

A single layer of 25mm Isover APR 1200 was placed in the stud cavity.

The framework was clad with a double layer of 15mm Gyproc SoundBloc on the both sides.

The inner layer of boards were fixed around the perimeter at 300mm centres using 25mm British Gypsum drywall screws.

The outer layer of boards were fixed around the perimeter and the intermediate stud positions at 300mm centres using 42mm British Gypsum drywall screws.

All vertical joints were staggered between layers. All joints and screw heads were taped. The perimeter was taped and sealed with Gyproc Sealant.

H19141GA

Hadley HRP5307 72mm standard track was fixed to the head and base of the aperture using 25mm British Gypsum drywall screws spaced at 600mm centres.

Hadley HRP5299 70mm 'C' studs were positioned between the head and base channels at each end of the aperture and fixed using 25mm British Gypsum drywall screws spaced at 600mm centres.

Hadley HRP5299 70mm 'C' studs were positioned between the head and base channels at 600mm centres.

The framework was clad with a double layer of 12.5mm Knauf Standard Wallboard on both sides.

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The inner layer of boards were fixed around the perimeter at 300mm centres using 25mm British Gypsum drywall screws.

The outer layer of boards were fixed around the perimeter and the intermediate stud positions at 300mm centres using 36mm British Gypsum drywall screws.

All vertical joints were staggered between layers. All joints and screw heads were taped. The perimeter was taped and sealed with Gyproc Sealant.

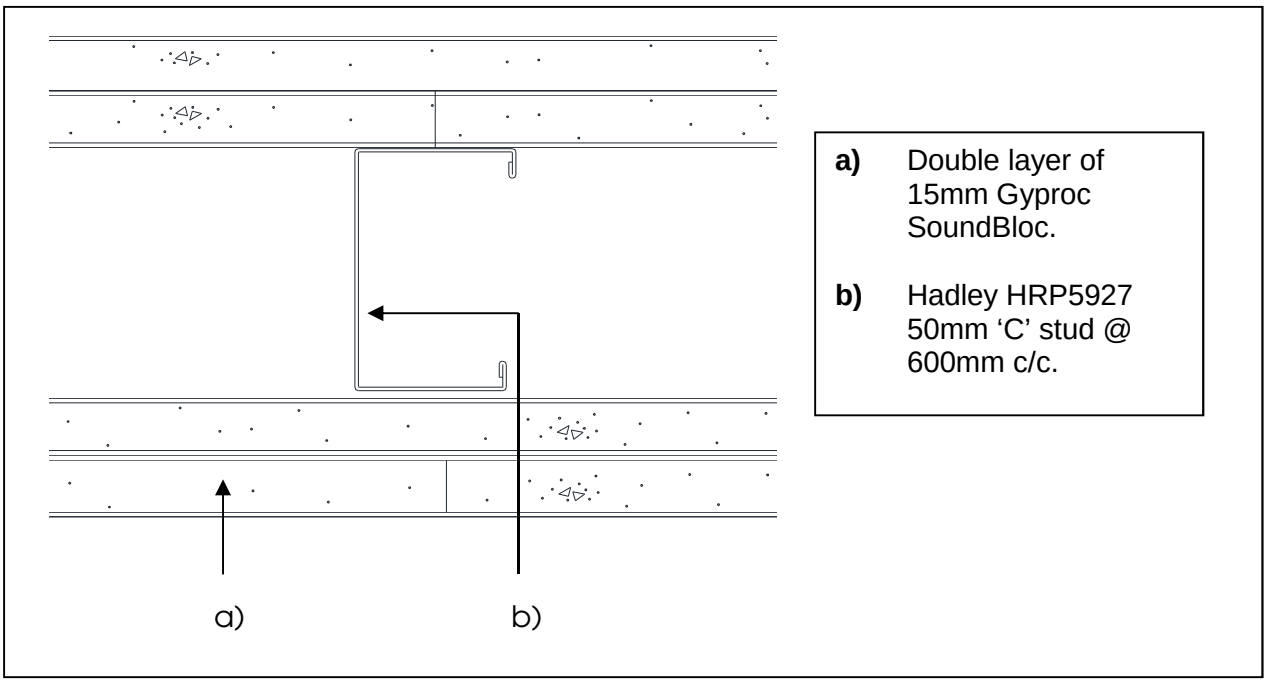

Figure 1. Horizontal cross section of partition of H19141EA.

The descriptions of individual components making up the test specimen were provided by the customer and were checked for accuracy wherever possible.

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TEST MATERIALS

Plasterboard

i) Nominally 2400mm (long) x 1200mm (wide) x 15mm (thick) Gyproc SoundBloc manufactured by British Gypsum, supplied by The Building Test Centre.

Surface density:	13.6kg/m^2
Average thickness:	14.9mm
Board Code:	16 181 15 08:40

ii) Nominally 2400mm (long) x 1200mm (wide) x 12.5mm (thick) Gyproc SoundBloc manufactured by British Gypsum, supplied by The Building Test Centre.

Surface density:	11.3kg/m^2
Average thickness:	12.4mm
Board Code:	16 193 15 09:57

iii) Nominally 2400mm (long) x 1200mm (wide) x 12.5mm (thick) Gyproc WallBoard manufactured by British Gypsum, supplied by The Building Test Centre.

Surface density:	7.9kg/m^2
Average thickness:	12.6mm
Board Code:	18 198 15 10:29

iv) Nominally 2400mm (long) x 1200mm (wide) x 12.5mm (thick) Knauf Standard Wallboard supplied by Hadley Group/Hadley Industries FZE (Dubai).

Surface density:	7.9kg/m^2
Average thickness:	12.3mm
Board Code:	09/07/2015 243647

The surface densities were calculated using the actual weight and size of a selection of the boards used in the test specimen.

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Insulation

i) Nominally 25mm thick Isover APR 1200 insulation supplied by Hadley Group/Hadley Industries FZE (Dubai).

Average area	24.00m²
Average weight	10.81kg
Density	18.02kg/m³

ii) Nominally 50mm thick Isover APR 1200 insulation supplied by Hadley Group/Hadley Industries FZE (Dubai).

Average area	15.60m²
Average weight	10.19kg
Density	13.06kg/m³

The density was calculated using the actual weight and size of the insulation used in the test specimen.

Metal Components

i) 0.5mm thick Hadley HRP5927 50mm 'C' studs
ii) 0.5mm thick Hadley HRP5305 52mm standard track
iii) 0.5mm thick Hadley HRP5299 70mm 'C' stud
iv) 0.5mm thick Hadley HRP5307 72mm standard track
v) 0.5mm thick Hardley HRP5302 146mm 'C'stud
vi) 0.5mm thick Hadley HRP5310 148mm standard track

All metal components are supplied by Hadley Group/Hadley Industries FZE (Dubai).

Fasteners

i) 25mm British Gypsum drywall screws
ii) 36mm British Gypsum drywall screws
iii) 42mm British Gypsum drywall screws

All fasteners supplied by The Building Test Centre.

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Miscellaneous Components

i) Gyproc Sealant
ii) Joint tape

All miscellaneous components supplied by The Building Test Centre.

Where measurements could not be taken, then weight and dimensions were provided by the customer or the manufacturer e.g. from material labelling. Material information was recorded according to procedure MAT/1.

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TEST RESULTS

Test Code	Description	Weighted Airborne Sound Reduction Index R_w (C; Ctr)
H19141AA	Double layer of 15mm Gyproc SoundBloc on Hadley 146mm 'C' studs, with 25mm Isover APR 1200 insulation within the cavity	60 (-3;-8) dB
H19141BA	Double layer of 15mm Gyproc SoundBloc on Hadley 146mm 'C' studs	58 (-2;-7) dB
H19141CA	Double layer of 12.5mm Gyproc SoundBloc on Hadley 146mm 'C' studs, with 25mm Isover APR 1200 insulation within the cavity	56 (-2;-7) dB
H19141DA	Single layer of 12.5mm Gyproc WallBoard on Hadley 50mm 'C' studs, with 25mm Isover APR 1200 insulation within the cavity	38 (-4;-10) dB
H19141EA	Double layer of 15mm Gyproc SoundBloc on Hadley 50mm 'C' studs	49 (-3;-9) dB
H19141FA	Double layer of 15mm Gyproc SoundBloc on Hadley 70mm 'C' studs, with 25mm Isover APR 1200 insulation within the cavity	55 (-2;-8) dB
H19141GA	Double layer of 12.5mm Knauf Standard Wallboard on Hadley 70mm 'C' studs	44 (-3;-10) dB

For full data see Appendix A of this report.

Test conducted in accordance with BS EN ISO 10140-2:2010 except for Clause A.2 in BS EN ISO 10140-4:2010 where minimum distances for measurements at frequencies under 100Hz can not be met.

Rated in accordance with BS EN ISO 717-1: 2013.

No visible damage of the test specimen occurred during test.

Testing to BS EN ISO 10140-2:2010 conforms to the requirements of BS EN ISO 140-3:1995 (withdrawn).

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Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

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Where the uncertainty of measured values is stated, (e.g. temperature, relative humidity and static pressure) the reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

TEST PROCEDURE

The test specimen (3.6 m x 2.4 m) was constructed in a wall dividing two reverberant rooms of approximately 98m^3 and 62m^3. The accuracy of the test method conforms to BS EN 20140-2:1993, the test procedure used is detailed in the test data in Appendix A of this report. Broad-band white noise was used to measure the level differences and broad-band pink noise was used to measure the reverberation times. Third octave band pass filters were used in real time mode. See appendix B for further information.

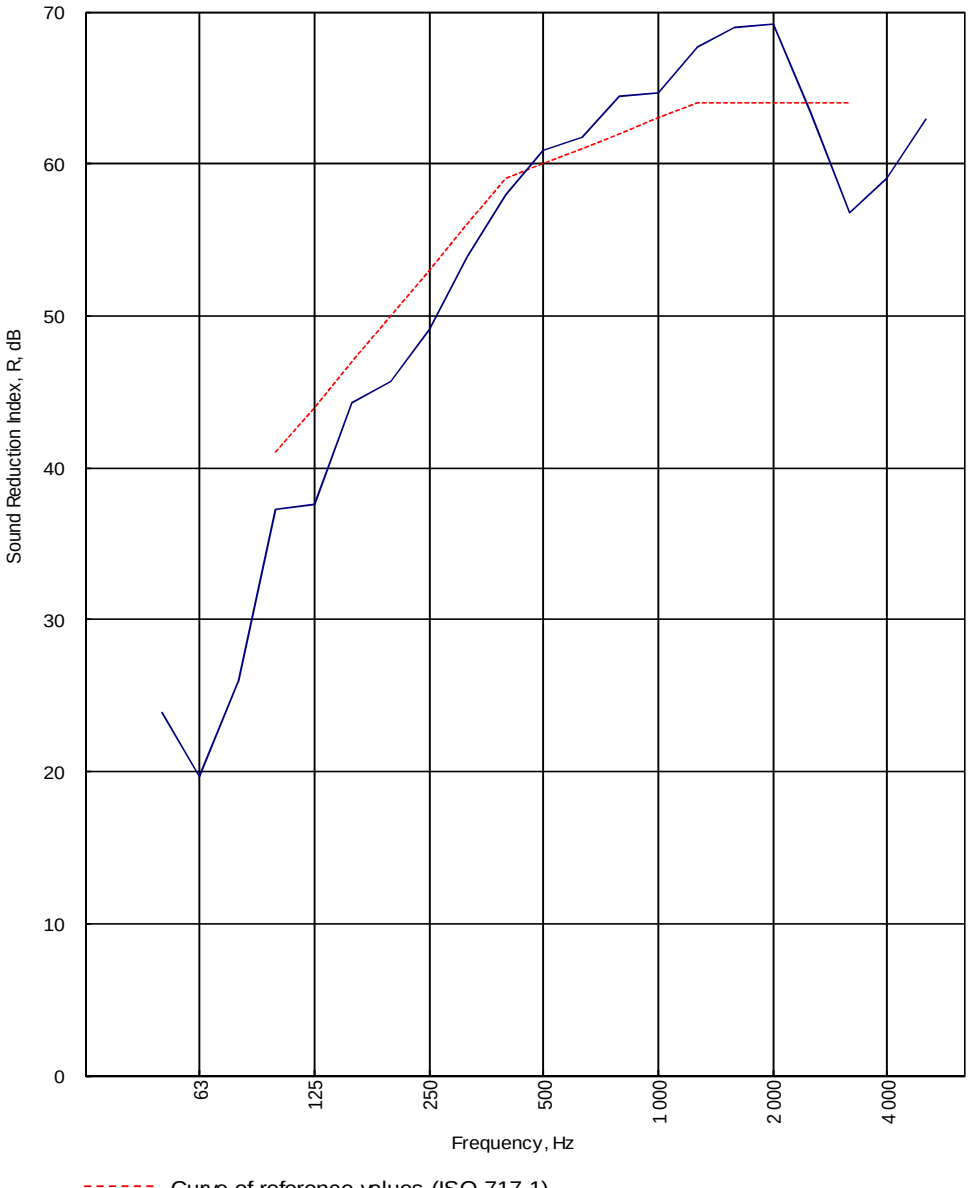
LIMITATIONS

The results only relate to the behaviour of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential acoustic performance of the element in use nor do they reflect the actual behaviour.

APPENDIX A - TEST DATA

Test Code:
H19141AA
Test Date:
20/07/2015

Freq. Hz	R dB
50	23.9
63	19.7
80	25.9
100	37.3
125	37.6
160	44.3
200	45.7
250	49.1
315	53.9
400	58.0
500	60.9
630	61.7
800	64.4
1 000	64.7
1 250	67.7
1 600	69.0
2 000	69.2
2 500	63.4
3 150	56.8
4 000	59.0
5 000	62.9



Rating according to BS EN ISO 717-1:2013	**Rw (C;Ctr) = 60 (-3;-8) dB**		
	Max dev. 7.2 dB at 3 150 Hz		
Evaluation based on laboratory measurement results obtained by an engineering method:	$C_{50\text{-}3150}$= **-8 dB**	$C_{50\text{-}5000}$= **-7 dB**	$C_{100\text{-}5000}$= **-2 dB**
	$C_{tr,50\text{-}3150}$= **-20 dB**	$C_{tr,50\text{-}5000}$= **-20 dB**	$C_{tr,100\text{-}5000}$: **-8 dB**

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H19141AA** Test Date: **20/07/2015**

	Room T2	Room T1	
Specimen Area, S = **8.64** m^2			
Room Volume, m^3:	**98**	**59.2**	
Temperature, deg.C:	**21.2**	**21.1**	**± 0.3**
Rel. Humidity, %RH:	**53.2**	**52.9**	**± 1.6**
Static Pressure, Pa:	**100200**	**100200**	**± 65**

	Test Room T2 to Test Room T1								
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	R 1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	91.1	66.5	17.8	66.5	0.93	-0.7	**23.9**		
63	91.2	70.6	14.4	70.6	0.89	-0.9	**19.7**		22.4
80	103.9	76.4	13.3	76.4	0.76	-1.6	**25.9**		
100	104.8	67.2	8.4	67.2	1.03	-0.3	**37.3**	3.7	
125	104.5	66.6	4.9	66.6	1.03	-0.3	**37.6**	6.4	38.8
160	110.4	67.4	1.3	67.4	1.47	1.3	**44.3**	2.7	
200	114.0	70.0	8.3	70.0	1.64	1.7	**45.7**	4.3	
250	114.8	67.6	1.1	67.6	1.68	1.9	**49.1**	3.9	48.4
315	113.6	61.2	4.1	61.2	1.55	1.5	**53.9**	2.1	
400	111.2	54.9	16.2	54.9	1.62	1.7	**58.0**	1.0	
500	109.3	50.1	4.2	50.1	1.61	1.7	**60.9**		59.9
630	107.0	47.0	3.3	47.0	1.62	1.7	**61.7**		
800	106.5	43.8	2.4	43.8	1.63	1.7	**64.4**		
1 000	105.5	42.5	10.4	42.5	1.64	1.7	**64.7**		65.4
1 250	104.2	38.1	4.4	38.1	1.60	1.6	**67.7**		
1 600	106.8	39.4	4.7	39.4	1.59	1.6	**69.0**		
2 000	108.1	40.5	4.0	40.5	1.58	1.6	**69.2**		66.3
2 500	106.0	43.8	3.0	43.8	1.45	1.2	**63.4**	0.6	
3 150	104.1	48.1	4.4	48.1	1.33	0.8	**56.8**	7.2	
4 000	103.0	44.9	7.3	44.9	1.35	0.9	**59.0**		58.9
5 000	105.7	43.5	11.5	43.5	1.28	0.7	**62.9**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**31.9**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**		
	60	**-3**	**-8**		
	(100-5000)	**-2**	**-8**		
	(50-3150)	**-8**	**-20**		
	(50-5000)	**-7**	**-20**		

Procedure: AP 046 vs 5.1

Worksheet: 140_3_1.XLS

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING

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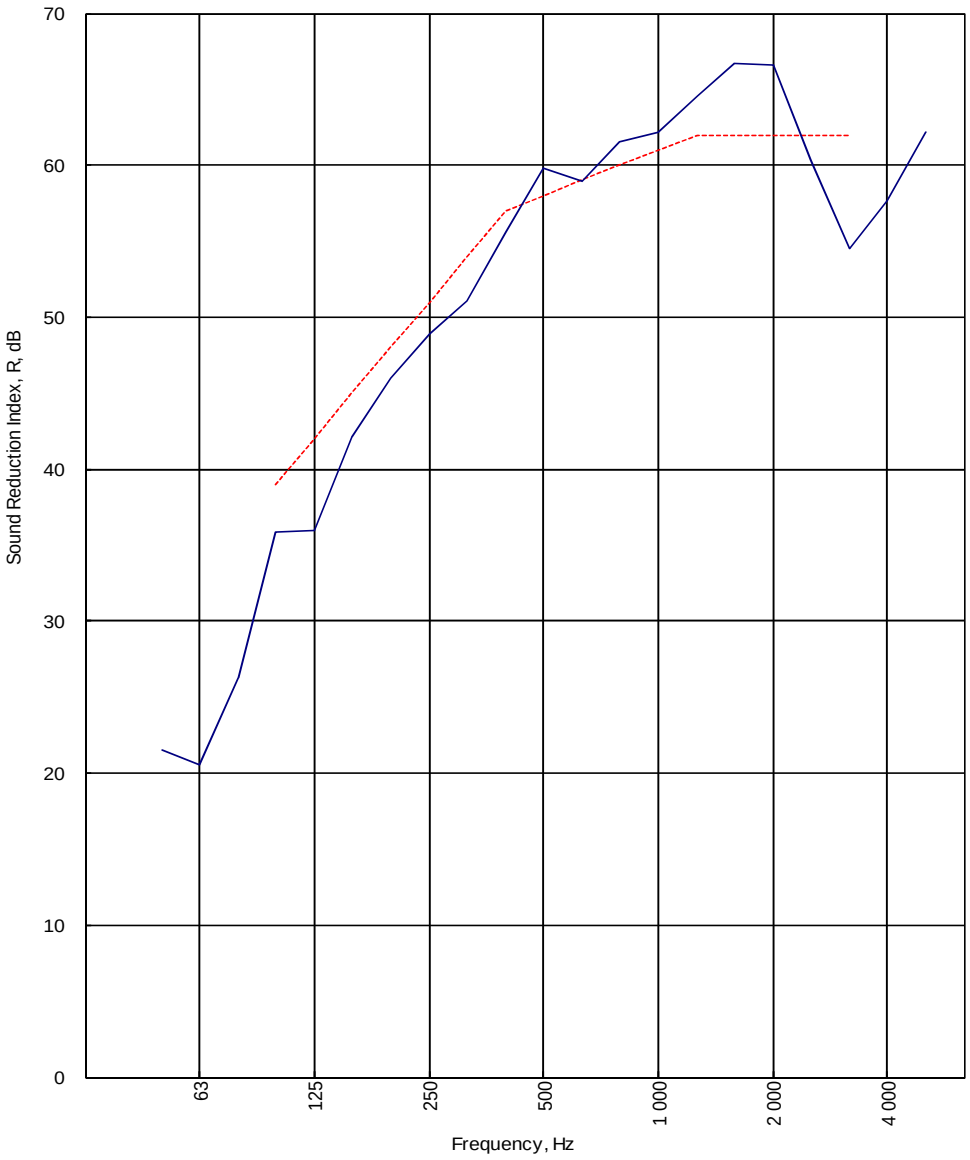
Test Code:
H19141BA
Test Date:
20/07/2015

Freq. Hz	R dB
50	21.5
63	20.5
80	26.3
100	35.9
125	36.0
160	42.1
200	46.0
250	48.9
315	51.1
400	55.6
500	59.8
630	58.9
800	61.5
1 000	62.2
1 250	64.6
1 600	66.7
2 000	66.6
2 500	60.3
3 150	54.5
4 000	57.7
5 000	62.2



Rating according to
BS EN ISO 717-1:2013

Rw (C;Ctr) = 58 (-2;-7) dB

Max dev. 7.5 dB at 3 150 Hz

Evaluation based on laboratory measurement results obtained by an engineering method:

$C_{50\text{-}3150}$= **-6 dB** $C_{50\text{-}5000}$= **-6 dB** $C_{100\text{-}5000}$= **-2 dB**

$C_{tr,50\text{-}3150}$= **-18 dB** $C_{tr,50\text{-}5000}$= **-18 dB** $C_{tr,100\text{-}5000}$: **-7 dB**

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING
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LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H19141BA** Test Date: **20/07/2015**

		Room T2	Room T1	
Specimen Area, S =	**8.64** m^2			
Room Volume, m^3:		**98**	**59.2**	
Temperature, deg.C:		**21.7**	**21.8**	**± 0.3**
Rel. Humidity, %RH:		**48.5**	**48.7**	**± 1.6**
Static Pressure, Pa:		**100100**	**100100**	**± 65**

	Test Room T2 to Test Room T1								
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	R 1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	58.1	35.6	16.8	35.6	0.88	-1.0	**21.5**		
63	61.7	40.5	11.5	40.5	0.93	-0.7	**20.5**		22.1
80	72.7	44.7	8.0	44.7	0.74	-1.7	**26.3**		
100	78.4	42.0	5.8	42.0	0.97	-0.5	**35.9**	3.1	
125	104.6	68.5	2.8	68.5	1.08	-0.1	**36.0**	6.0	37.2
160	84.5	43.6	3.3	43.6	1.46	1.2	**42.1**	2.9	
200	88.8	44.3	9.1	44.3	1.54	1.5	**46.0**	2.0	
250	90.6	43.5	0.9	43.5	1.66	1.8	**48.9**	2.1	48.2
315	90.4	41.0	5.1	41.0	1.62	1.7	**51.1**	2.9	
400	88.8	35.0	22.4	**34.8**	1.57	1.6	**55.6**	1.4	
500	87.7	29.5	4.8	29.5	1.57	1.6	**59.8**		57.7
630	86.2	28.9	3.2	28.9	1.59	1.6	**58.9**	0.1	
800	86.7	26.9	2.2	26.9	1.61	1.7	**61.5**		
1 000	86.7	26.2	9.5	26.2	1.62	1.7	**62.2**		62.6
1 250	87.2	24.1	1.7	24.1	1.56	1.5	**64.6**		
1 600	90.1	25.1	1.8	25.1	1.64	1.7	**66.7**		
2 000	92.0	27.0	2.9	27.0	1.57	1.6	**66.6**		63.4
2 500	90.9	31.7	2.6	31.7	1.41	1.1	**60.3**	1.7	
3 150	90.2	36.6	4.0	36.6	1.35	0.9	**54.5**	7.5	
4 000	90.8	33.9	7.5	33.9	1.32	0.8	**57.7**		57.1
5 000	95.7	34.3	10.2	34.3	1.31	0.8	**62.2**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**29.7**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**		
	58	**-2**	**-7**		
	(100-5000)	**-2**	**-7**		
Background Corrected	**(50-3150)**	**-6**	**-18**		
	(50-5000)	**-6**	**-18**		

Procedure: AP 046 vs 5.1

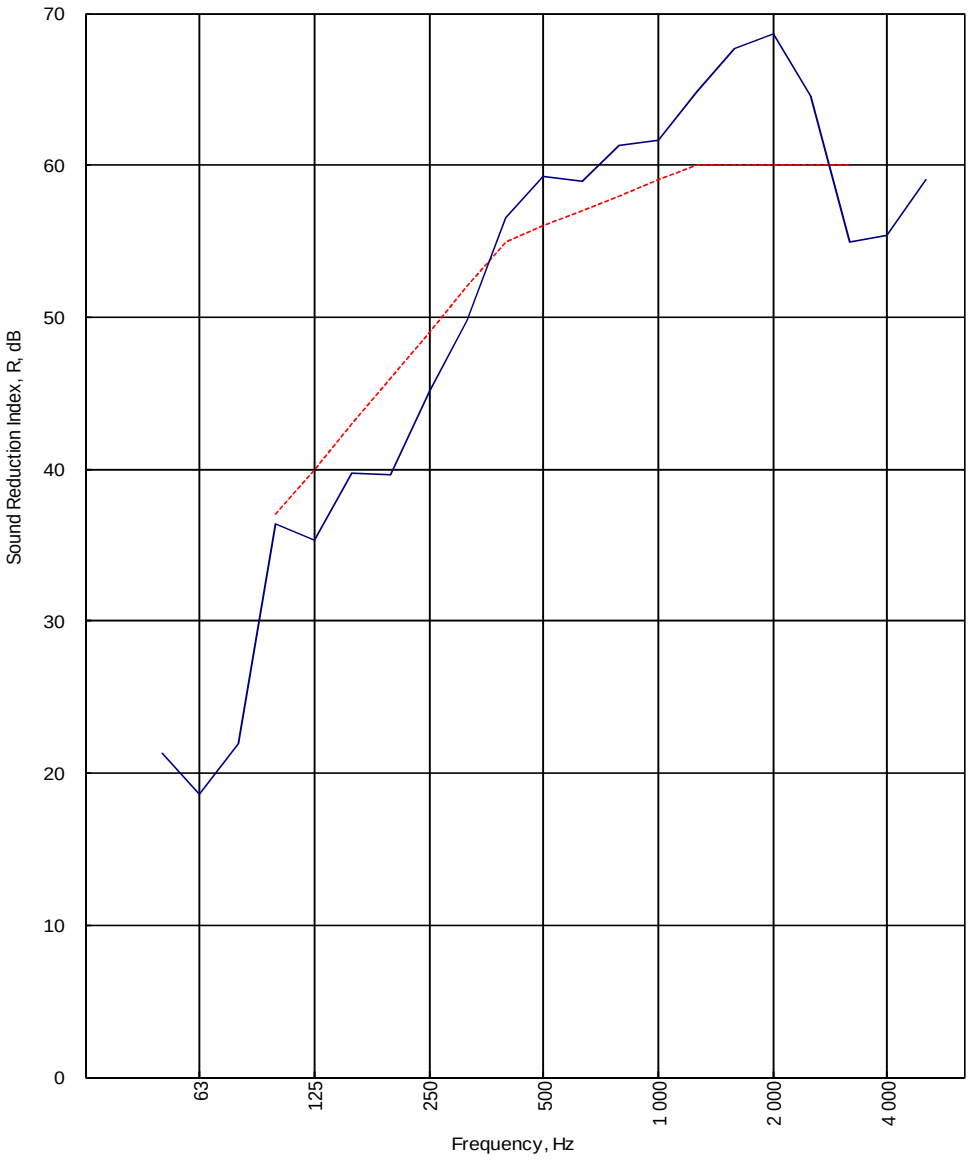
Worksheet: 140_3_1.XLS

UKAS TESTING

0296

Test Code:
H19141CA
Test Date:
20/07/2015

Freq. Hz	R dB
50	21.3
63	18.6
80	22.0
100	36.4
125	35.3
160	39.7
200	39.6
250	45.1
315	49.8
400	56.6
500	59.3
630	58.9
800	61.3
1 000	61.6
1 250	64.9
1 600	67.7
2 000	68.7
2 500	64.6
3 150	55.0
4 000	55.4
5 000	59.0



Rating according to
BS EN ISO 717-1:2013

Rw (C;Ctr) = 56 (-2;-7) dB

Max dev. 6.4 dB at 200 Hz

Evaluation based on laboratory measurement results obtained by an engineering method:

$C_{50\text{-}3150}$= **-7 dB** $C_{50\text{-}5000}$= **-6 dB** $C_{100\text{-}5000}$= **-1 dB**

$C_{tr,50\text{-}3150}$= **-18 dB** $C_{tr,50\text{-}5000}$= **-18 dB** $C_{tr,100\text{-}5000}$: **-7 dB**

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING
0296

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H19141CA** Test Date: **20/07/2015**

		Room T2	Room T1	
Specimen Area, S =	**8.64** m^2			
Room Volume, m^3:		**98**	**59.29**	
Temperature, deg.C:		**22**	**21.9**	**± 0.3**
Rel. Humidity, %RH:		**61.8**	**62.1**	**± 1.6**
Static Pressure, Pa:		**100000**	**100000**	**± 65**

	Test Room T2 to Test Room T1								
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	R 1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	59.2	35.8	20.2	35.8	0.67	-2.1	**21.3**		
63	62.6	42.6	21.5	42.6	0.79	-1.4	**18.6**		20.4
80	73.4	49.4	12.2	49.4	0.69	-2.0	**22.0**		
100	78.8	42.0	13.0	42.0	1.01	-0.4	**36.4**	0.6	
125	104.3	69.1	5.0	69.1	1.12	0.1	**35.3**	4.7	36.8
160	83.7	44.7	3.0	44.7	1.30	0.7	**39.7**	3.3	
200	88.6	50.6	9.8	50.6	1.57	1.6	**39.6**	6.4	
250	90.4	47.1	1.4	47.1	1.68	1.8	**45.1**	3.9	43.0
315	89.9	41.5	5.4	41.5	1.50	1.4	**49.8**	2.2	
400	111.6	56.6	24.2	56.6	1.60	1.6	**56.6**		
500	87.6	29.9	6.2	29.9	1.60	1.6	**59.3**		58.1
630	86.2	28.9	3.3	28.9	1.59	1.6	**58.9**		
800	86.9	27.2	2.2	27.2	1.60	1.6	**61.3**		
1 000	86.8	26.7	9.7	26.7	1.55	1.5	**61.6**		62.3
1 250	87.3	23.9	1.7	23.9	1.56	1.5	**64.9**		
1 600	90.2	24.2	1.8	24.2	1.62	1.7	**67.7**		
2 000	92.1	25.1	2.8	25.1	1.61	1.7	**68.7**		66.6
2 500	91.1	27.8	2.7	27.8	1.48	1.3	**64.6**		
3 150	90.4	36.4	4.3	36.4	1.38	1.0	**55.0**	5.0	
4 000	91.0	36.6	7.3	36.6	1.38	1.0	**55.4**		56.1
5 000	96.1	37.9	11.2	37.9	1.33	0.8	**59.0**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**26.1**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**		
	56	**-2**	**-7**		
	(100-5000)	**-1**	**-7**		
	(50-3150)	**-7**	**-18**		
	(50-5000)	**-6**	**-18**		

Procedure: AP 046 vs 5.1

Worksheet: 140_3_1.XLS

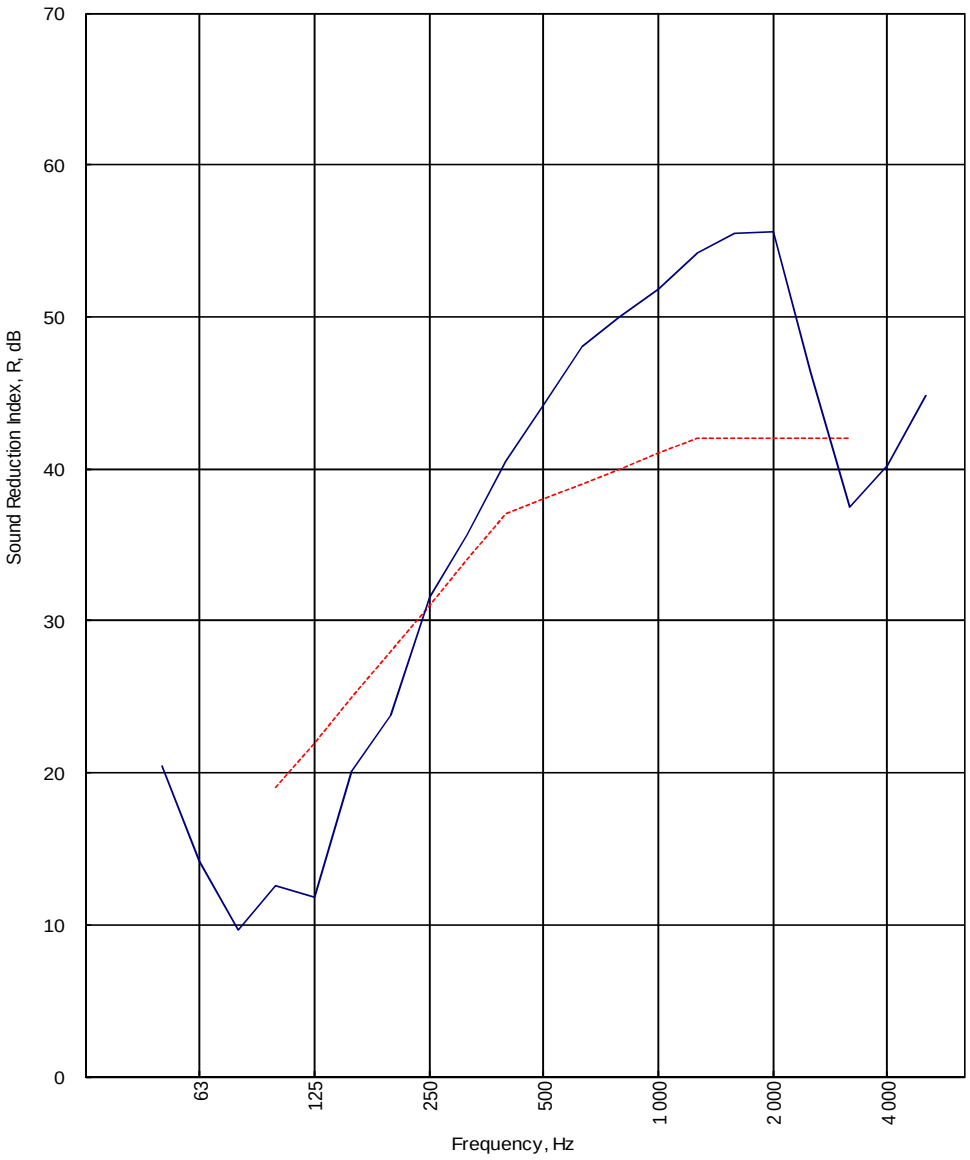
Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING

0296

Test Code:
H19141DA
Test Date:
21/07/2015

Freq. Hz	R dB
50	20.4
63	14.2
80	9.7
100	12.6
125	11.8
160	20.1
200	23.8
250	31.5
315	35.7
400	40.5
500	44.2
630	48.1
800	50.0
1 000	51.8
1 250	54.2
1 600	55.5
2 000	55.6
2 500	46.3
3 150	37.5
4 000	40.2
5 000	44.8



Rating according to
BS EN ISO 717-1:2013

Rw (C;Ctr) = 38 (-4;-10) dB

Max dev. 10.2 dB at 125 Hz

Evaluation based on laboratory measurement results obtained by an engineering method:

$C_{50\text{-}3150}$= **-4 dB** $C_{50\text{-}5000}$= **-3 dB** $C_{100\text{-}5000}$= **-3 dB**

$C_{tr,50\text{-}3150}$= **-12 dB** $C_{tr,50\text{-}5000}$= **-12 dB** $C_{tr,100\text{-}5000}$: **-10 dB**

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING
0296

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H19141DA** Test Date: **21/07/2015**

		Room T2	Room T1	
Specimen Area, S =	**8.64** m^2	Room Volume, m^3:	**98**	**60.33**	
		Temperature, deg.C:	**20.2**	**20.5**	**± 0.3**
		Rel. Humidity, %RH:	**57.8**	**58.3**	**± 1.6**
		Static Pressure, Pa:	**100300**	**100300**	**± 65**

	Test Room T2 to Test Room T1								R
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	59.9	37.7	18.7	37.7	0.74	-1.8	**20.4**		
63	62.6	47.1	17.3	47.1	0.83	-1.3	**14.2**		12.9
80	71.9	59.8	15.0	59.8	0.64	-2.4	**9.7**		
100	77.5	62.9	14.6	62.9	0.70	-2.0	**12.6**	6.4	
125	102.5	89.1	4.8	89.1	0.77	-1.6	**11.8**	10.2	13.6
160	83.2	62.8	2.4	62.8	1.04	-0.3	**20.1**	4.9	
200	87.2	64.8	7.7	64.8	1.55	1.4	**23.8**	4.2	
250	90.2	60.5	1.4	60.5	1.68	1.8	**31.5**		27.7
315	89.9	55.8	4.5	55.8	1.60	1.6	**35.7**		
400	88.4	49.2	16.1	49.2	1.51	1.3	**40.5**		
500	87.4	44.6	1.6	44.6	1.53	1.4	**44.2**		43.2
630	86.2	39.6	3.2	39.6	1.58	1.5	**48.1**		
800	86.9	38.5	2.4	38.5	1.63	1.6	**50.0**		
1 000	86.7	36.5	10.6	36.5	1.62	1.6	**51.8**		51.7
1 250	87.4	34.8	1.7	34.8	1.62	1.6	**54.2**		
1 600	90.1	36.2	2.3	36.2	1.62	1.6	**55.5**		
2 000	92.0	38.1	3.2	38.1	1.65	1.7	**55.6**		50.1
2 500	90.9	45.8	2.5	45.8	1.46	1.2	**46.3**		
3 150	90.1	53.5	4.0	53.5	1.37	0.9	**37.5**	4.5	
4 000	90.7	51.4	6.9	51.4	1.36	0.9	**40.2**		39.9
5 000	95.8	51.8	11.6	51.8	1.33	0.8	**44.8**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**30.2**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**		
	38	**-4**	**-10**		
	(100-5000)	**-3**	**-10**		
	(50-3150)	**-4**	**-12**		
	(50-5000)	**-3**	**-12**		

Procedure: AP 046 vs 5.1

Worksheet: 140_3_1.XLS

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

UKAS TESTING

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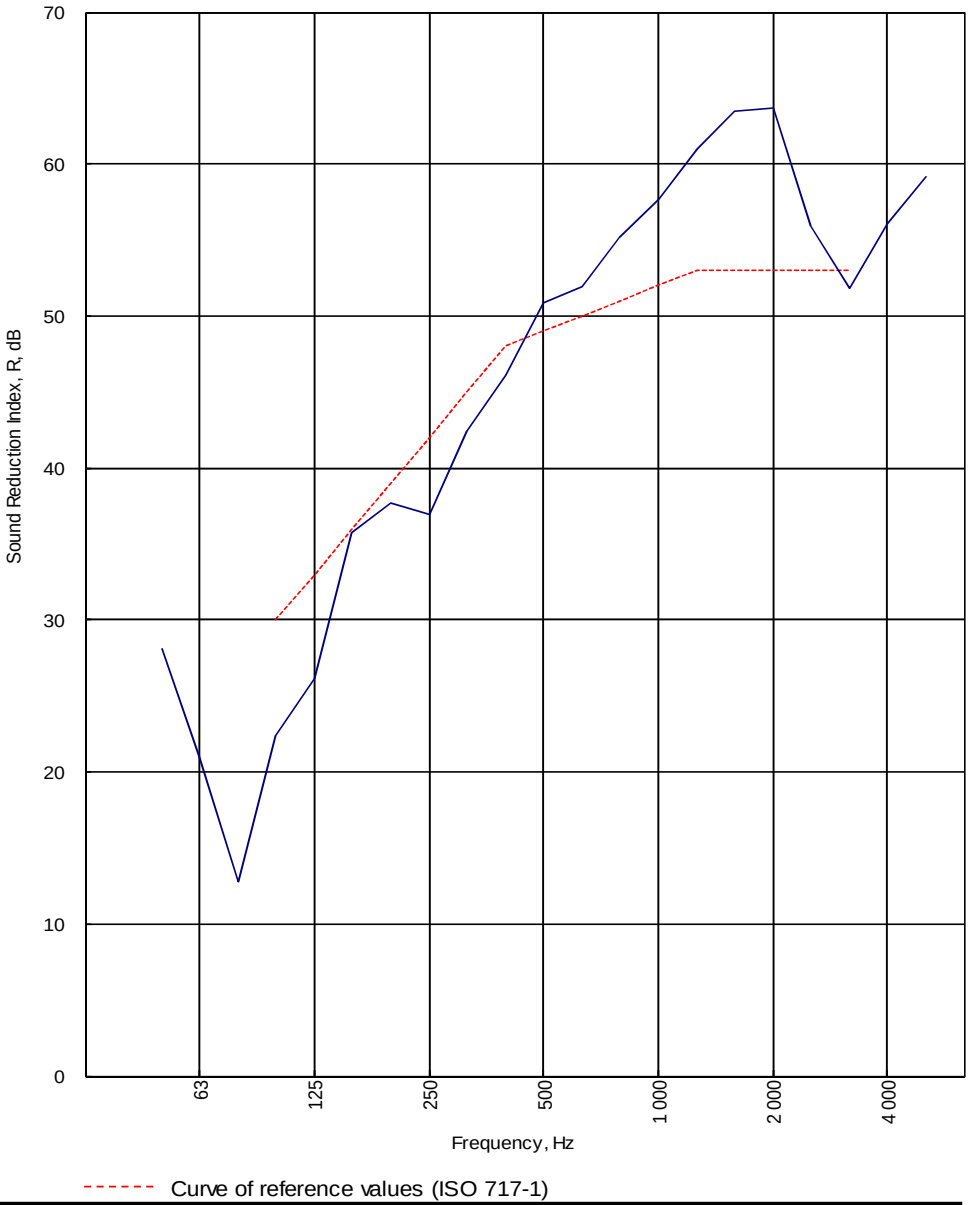
Test Code:
H19141EA
Test Date:
21/07/2015

Freq. Hz	R dB
50	28.1
63	21.0
80	12.8
100	22.4
125	26.2
160	35.8
200	37.7
250	36.9
315	42.4
400	46.1
500	50.9
630	51.9
800	55.2
1 000	57.7
1 250	61.0
1 600	63.5
2 000	63.7
2 500	55.9
3 150	51.8
4 000	56.0
5 000	59.2



Rating according to BS EN ISO 717-1:2013

Rw (C;Ctr) = 49 (-3;-9) dB

Max dev. 7.6 dB at 100 Hz

Evaluation based on laboratory measurement results obtained by an engineering method:

$C_{50\text{-}3150}$= **-6 dB** $C_{50\text{-}5000}$= **-5 dB** $C_{100\text{-}5000}$= **-2 dB**

$C_{tr,50\text{-}3150}$= **-17 dB** $C_{tr,50\text{-}5000}$= **-17 dB** $C_{tr,100\text{-}5000}$: **-9 dB**

UKAS TESTING 0296

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H19141EA** Test Date: **21/07/2015**

		Room T2	Room T1	
Specimen Area, S =	**8.64** m^2			
Room Volume, m^3:		**98**	**60.03**	
Temperature, deg.C:		**21.7**	**21.9**	**± 0.3**
Rel. Humidity, %RH:		**56.3**	**56.2**	**± 1.6**
Static Pressure, Pa:		**100300**	**100300**	**± 65**

	Test Room T2 to Test Room T1								
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	R 1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	59.7	30.3	18.2	**30.0**	0.77	-1.6	**28.1**		
63	63.9	42.2	15.8	42.2	0.95	-0.7	**21.0**		16.8
80	71.5	56.6	16.6	56.6	0.68	-2.1	**12.8**		
100	78.4	55.3	15.5	55.3	0.94	-0.7	**22.4**	7.6	
125	104.8	78.5	8.9	78.5	1.08	-0.1	**26.2**	6.8	25.5
160	84.1	49.2	8.2	49.2	1.36	0.9	**35.8**	0.2	
200	88.2	52.2	10.2	52.2	1.65	1.7	**37.7**	1.3	
250	90.1	55.1	6.8	55.1	1.71	1.9	**36.9**	5.1	38.4
315	90.0	49.4	8.1	49.4	1.68	1.8	**42.4**	2.6	
400	88.6	43.8	22.0	43.8	1.51	1.3	**46.1**	1.9	
500	87.5	37.9	6.8	37.9	1.50	1.3	**50.9**		48.8
630	86.3	35.9	5.6	35.9	1.57	1.5	**51.9**		
800	86.8	33.2	4.7	33.2	1.62	1.6	**55.2**		
1 000	86.7	30.8	10.6	30.8	1.67	1.8	**57.7**		57.4
1 250	87.3	28.0	3.6	28.0	1.64	1.7	**61.0**		
1 600	90.0	28.3	3.8	28.3	1.70	1.8	**63.5**		
2 000	92.0	30.0	4.1	30.0	1.64	1.7	**63.7**		59.4
2 500	90.9	36.2	3.4	36.2	1.47	1.2	**55.9**		
3 150	90.2	39.2	4.4	39.2	1.35	0.8	**51.8**	1.2	
4 000	90.8	35.8	7.1	35.8	1.40	1.0	**56.0**		54.6
5 000	95.9	37.6	11.2	37.6	1.36	0.9	**59.2**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**26.7**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**		
	49	**-3**	**-9**		
	(100-5000)	**-2**	**-9**		
Background Corrected	**(50-3150)**	**-6**	**-17**		
	(50-5000)	**-5**	**-17**		

Procedure: AP 046 vs 5.1

Worksheet: 140_3_1.XLS

UKAS TESTING

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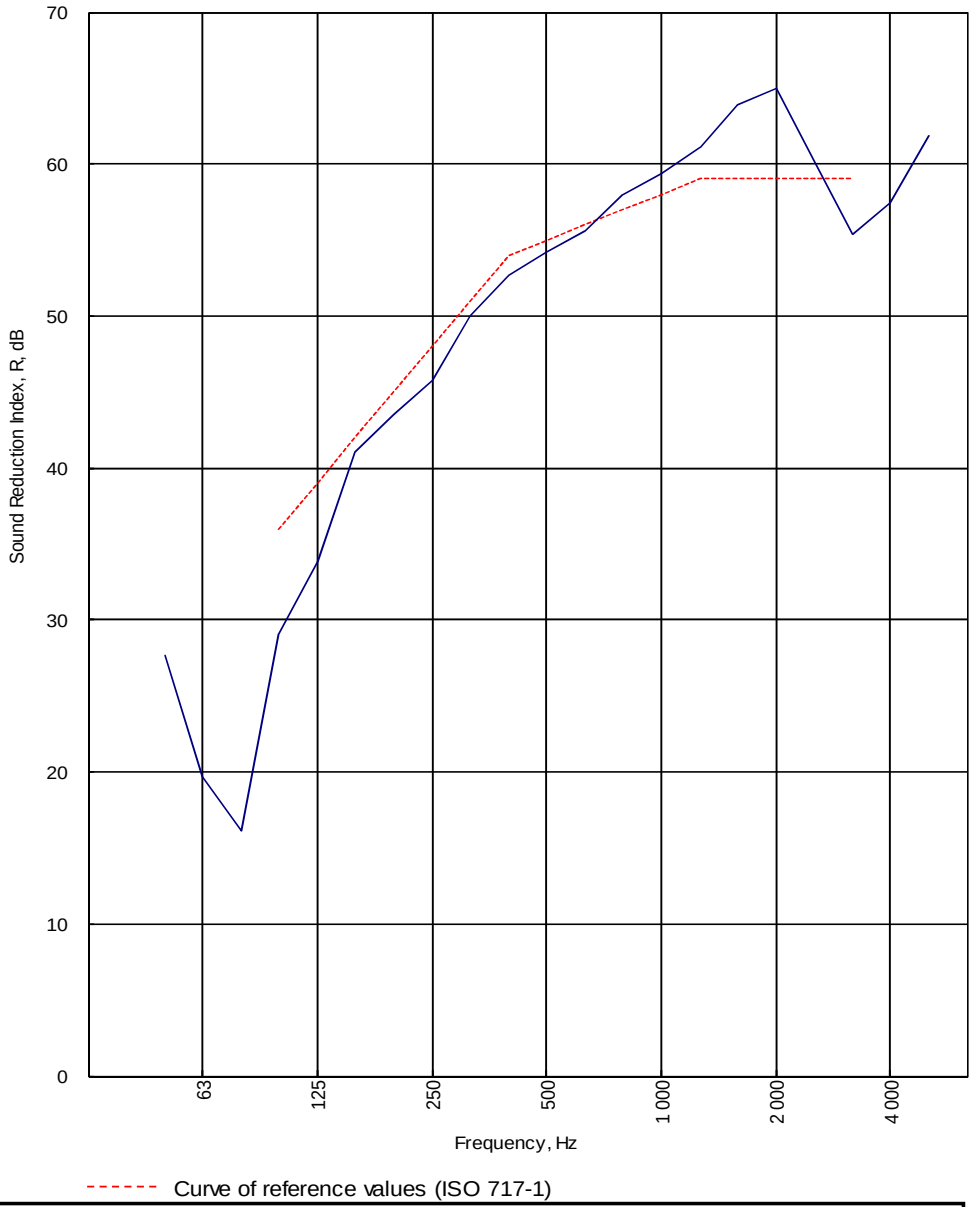
Test Code:
H19141FA
Test Date:
21/07/2015

Freq. Hz	R dB
50	27.7
63	19.7
80	16.1
100	29.1
125	33.8
160	41.0
200	43.5
250	45.8
315	50.0
400	52.7
500	54.2
630	55.6
800	58.0
1 000	59.4
1 250	61.1
1 600	63.9
2 000	65.0
2 500	60.2
3 150	55.4
4 000	57.4
5 000	61.9



Rating according to
BS EN ISO 717-1:2013

Rw (C;Ctr) = 55 (-2;-8) dB

Max dev. 6.9 dB at 100 Hz

Evaluation based on laboratory measurement results obtained by an engineering method:

$C_{50\text{-}3150}$= **-8 dB** $C_{50\text{-}5000}$= **-7 dB** $C_{100\text{-}5000}$= **-2 dB**

$C_{tr,50\text{-}3150}$= **-19 dB** $C_{tr,50\text{-}5000}$= **-19 dB** $C_{tr,100\text{-}5000}$: **-8 dB**

UKAS TESTING
0296

Customer**: Hadley Group/Hadley Industries FZE (Dubai)**

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H19141FA** Test Date: **21/07/2015**

		Room T2	Room T1	
Specimen Area, S =	**8.64** m^2			
	Room Volume, m^3:	**98**	**59.86**	
	Temperature, deg.C:	**22.1**	**22.1**	**± 0.3**
	Rel. Humidity, %RH:	**54.2**	**55.7**	**± 1.6**
	Static Pressure, Pa:	**100300**	**100300**	**± 65**

	Test Room T2 to Test Room T1								
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	R 1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	60.4	31.3	20.0	**31.0**	0.75	-1.7	**27.7**		
63	62.9	42.4	20.4	42.4	0.92	-0.8	**19.7**		19.1
80	72.0	53.8	13.8	53.8	0.68	-2.1	**16.1**		
100	79.1	49.1	8.5	49.1	0.91	-0.9	**29.1**	6.9	
125	103.6	69.6	8.7	69.6	1.05	-0.2	**33.8**	5.2	32.4
160	83.9	44.0	7.2	44.0	1.44	1.1	**41.0**	1.0	
200	88.2	46.5	10.8	46.5	1.69	1.8	**43.5**	1.5	
250	90.2	46.4	6.2	46.4	1.75	2.0	**45.8**	2.2	45.7
315	90.0	41.6	8.6	41.6	1.60	1.6	**50.0**	1.0	
400	88.3	37.0	21.7	37.0	1.54	1.4	**52.7**	1.3	
500	87.4	34.5	7.9	34.5	1.50	1.3	**54.2**	0.8	54.0
630	86.0	31.9	7.6	31.9	1.57	1.5	**55.6**	0.4	
800	86.6	30.3	9.0	30.3	1.64	1.7	**58.0**		
1 000	86.6	28.9	12.8	28.9	1.63	1.7	**59.4**		59.3
1 250	87.1	27.5	10.1	27.5	1.57	1.5	**61.1**		
1 600	90.0	27.7	12.4	27.7	1.60	1.6	**63.9**		
2 000	92.0	28.6	9.2	28.6	1.62	1.6	**65.0**		62.5
2 500	91.0	32.0	5.7	32.0	1.45	1.2	**60.2**		
3 150	90.3	35.7	7.9	35.7	1.34	0.8	**55.4**	3.6	
4 000	90.9	34.3	9.0	34.3	1.34	0.8	**57.4**		57.5
5 000	95.9	34.8	12.3	34.8	1.32	0.8	**61.9**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**23.9**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**		
	55	**-2**	**-8**		
	(100-5000)	**-2**	**-8**		
Background Corrected	**(50-3150)**	**-8**	**-19**		
	(50-5000)	**-7**	**-19**		

Procedure: AP 046 vs 5.1

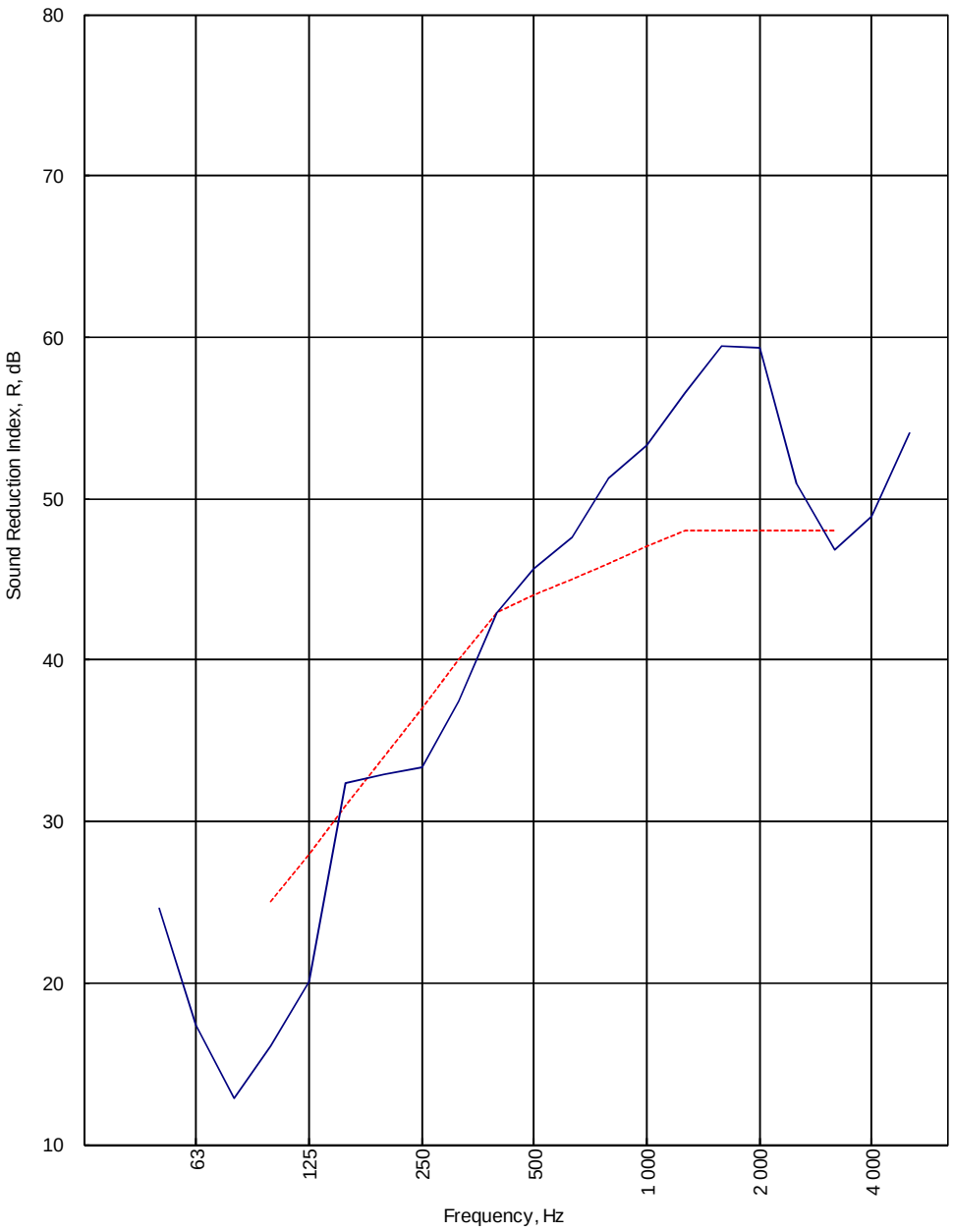
Worksheet: 140_3_1.XLS

UKAS TESTING

0296

Test Code:
H19141GA
Test Date:
21/07/2015

Freq. Hz	R dB
50	24.6
63	17.4
80	12.9
100	16.1
125	20.1
160	32.4
200	32.9
250	33.3
315	37.4
400	43.0
500	45.7
630	47.6
800	51.3
1 000	53.3
1 250	56.5
1 600	59.4
2 000	59.3
2 500	50.9
3 150	46.8
4 000	48.9
5 000	54.1



Rating according to
BS EN ISO 717-1:2013

Rw (C;Ctr) = 44 (-3;-10) dB

Max dev. 8.9 dB at 100 Hz

Evaluation based on laboratory measurement results obtained by an engineering method:

$C_{50\text{-}3150}$= **-4 dB** $C_{50\text{-}5000}$= **-4 dB** $C_{100\text{-}5000}$= **-2 dB**

$C_{tr,50\text{-}3150}$= **-14 dB** $C_{tr,50\text{-}5000}$= **-14 dB** $C_{tr,100\text{-}5000}$: **-10 dB**

UKAS TESTING
0296

LABORATORY AIRBORNE SOUND INSULATION TEST - BS EN ISO 10140-2:2010

Test Code: **H19141GA** Test Date: **21/07/2015**

		Room T2	Room T1	
Specimen Area, S =	**8.64** m^2			
	Room Volume, m^3:	**98**	**59.95**	
	Temperature, deg.C:	**21.1**	**21.5**	**± 0.3**
	Rel. Humidity, %RH:	**59.4**	**57.7**	**± 1.6**
	Static Pressure, Pa:	**100300**	**100400**	**± 65**

	Test Room T2 to Test Room T1								
Freq	Source	Rec. (uc)	Bgrnd	Rec. (corr)	Rev.time	Corr.	**R**	U.Dev.	R 1/1Oct
Hz	dB	dB	dB	dB	Sec	dB	**dB**	dB	dB
50	59.6	33.7	17.5	33.7	0.82	-1.3	**24.6**		
63	62.7	44.0	10.1	44.0	0.83	-1.3	**17.4**		16.1
80	72.6	57.8	5.0	57.8	0.71	-1.9	**12.9**		
100	77.6	60.3	7.3	60.3	0.84	-1.2	**16.1**	8.9	
125	104.4	83.6	3.3	83.6	0.95	-0.7	**20.1**	7.9	19.3
160	84.0	52.1	2.5	52.1	1.24	0.5	**32.4**		
200	88.3	56.8	8.8	56.8	1.55	1.4	**32.9**	1.1	
250	89.8	58.4	0.4	58.4	1.70	1.9	**33.3**	3.7	34.1
315	89.7	54.1	3.5	54.1	1.69	1.8	**37.4**	2.6	
400	88.7	47.2	18.5	47.2	1.57	1.5	**43.0**		
500	87.3	43.0	2.7	43.0	1.52	1.4	**45.7**		45.0
630	86.0	39.8	3.5	39.8	1.55	1.4	**47.6**		
800	86.7	36.9	3.8	36.9	1.56	1.5	**51.3**		
1 000	86.7	35.1	11.8	35.1	1.63	1.7	**53.3**		53.2
1 250	87.3	32.3	3.1	32.3	1.57	1.5	**56.5**		
1 600	90.1	32.3	2.1	32.3	1.60	1.6	**59.4**		
2 000	92.0	34.1	3.5	34.1	1.53	1.4	**59.3**		54.6
2 500	90.9	41.1	2.8	41.1	1.43	1.1	**50.9**		
3 150	90.0	44.0	4.2	44.0	1.32	0.8	**46.8**	1.2	
4 000	90.9	42.9	7.5	42.9	1.37	0.9	**48.9**		49.0
5 000	96.2	42.8	11.1	42.8	1.31	0.7	**54.1**		
6 300									
8 000									
10 000									

Single Figure Ratings	**Rw**	**C**	**Ctr**	**Total U. Dev., dB**	**25.4**
BS EN ISO 717-1: 2013	**dB**	**dB**	**dB**		
	44	**-3**	**-10**		
	(100-5000)	**-2**	**-10**		
	(50-3150)	**-4**	**-14**		
	(50-5000)	**-4**	**-14**		

Procedure: AP 046 vs 5.1

Worksheet: 140_3_1.XLS

UKAS TESTING

0296

APPENDIX B - TEST METHOD AND CONDITIONS

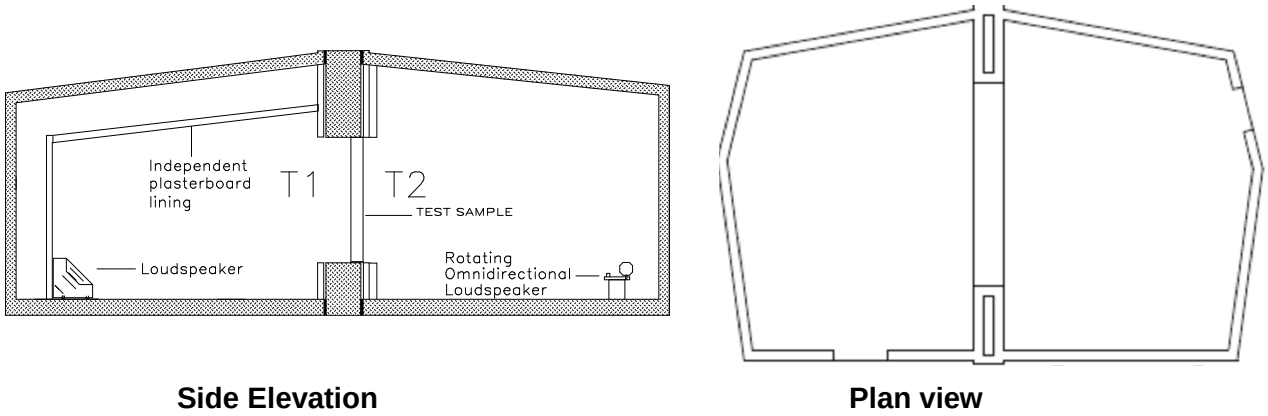
Method

The average sound pressure level in each 1/3 octave band is measured using a rotating microphone boom, positioned such that the minimum distance between microphone and sound source is 1m and between microphone and room boundaries is 0.7m. The rotating microphone has a sweep radius of at least 1m and is inclined in relation to the boundaries at an angle of at least 30^{o} to the horizontal. The microphone has a traverse time of 32 seconds, and the sound pressure levels are averaged over 64 seconds which is equivalent to two complete sweeps of the microphone boom.

The equivalent absorption area of the receiving room is determined by producing the arithmetic average of twelve reverberation times and applying this to the Sabine formula.

Test Chamber Layout

The test suite is constructed to be as independent from the surround building as is physically possibly in order to minimise flanking transmission paths.



Side Elevation **Plan view**

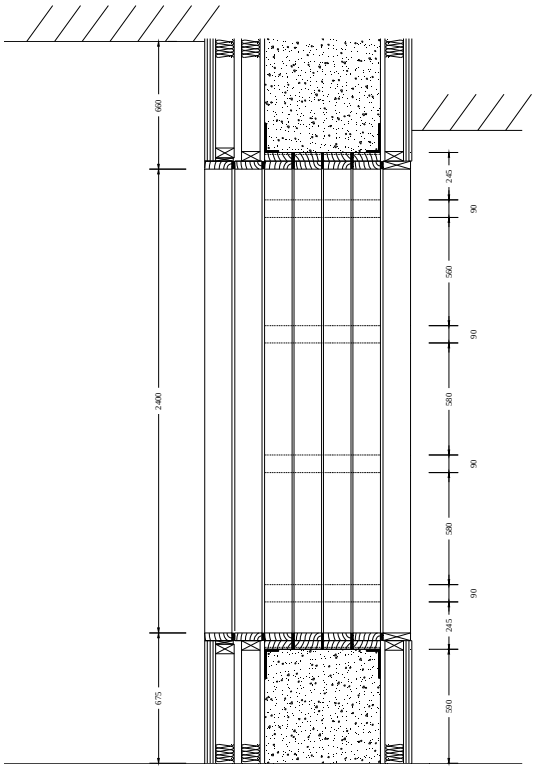
Test Chamber Shape

The source room (T2) contains two perspex diffusers of approximately 900mm x 1220mm. Panel absorbers are used to ensure reverberation times in source room (T2) are between one and two seconds at all frequencies at and above 100 Hz. An omni-directional loudspeaker sound source is placed near a back corner of the source room (T2), rotating at 1 rpm and at least 0.7m from any room boundary. A stationary loudspeaker sound source is placed in the corner of the receiving room (T1) opposite the test specimen.

Mounting

The BTC has a solid concrete frame which has been additionally lined to give improved reduction of flanking transmission. This is in order to ensure that, as far as possible, lab limits will not restrict the real performance measurement of just the test specimen.

Recommendations for installation position within the niche are given in our Installation Guidance Document. Details of actual installation position are held by the BTC in the Test Report folder.



Cross section of test aperture

Lab Limits

The laboratory limit for measurement due to flanking is (combined BTC 11709A, BTC13562EA, BTC 15398A and BTC 15829A).

Freq Hz	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
R'max	45.0	46.9	58.5	62.4	62.9	67.7	71.2	77.2	84.2	92.0	97.7	101.5	103.8	97.6	102.4	104.8	101.8	102.9	98.7	96.4	96.2

Uncertainties for test

The uncertainties values for test are taken from ISO 12999-1 situation B situ standard deviation.

Freq Hz	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000
Standard Uncertainty	4.0	3.6	3.2	2.8	2.4	2.0	1.8	1.6	1.4	1.2	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.3	1.6	1.9	2.2

Descriptor	Rw	Rw + C (100-3150)	Rw + Ctr (100-3150)	Rw + C (100-5000)	Rw + Ctr (100-5000)	Rw + C (50-3150)	Rw + Ctr (50-3150)	Rw + C (50-5000)	Rw + Ctr (50-5000)
Standard Uncertainty	0.9	0.9	1.1	1.1	1.1	1.0	1.3	1.1	1.0